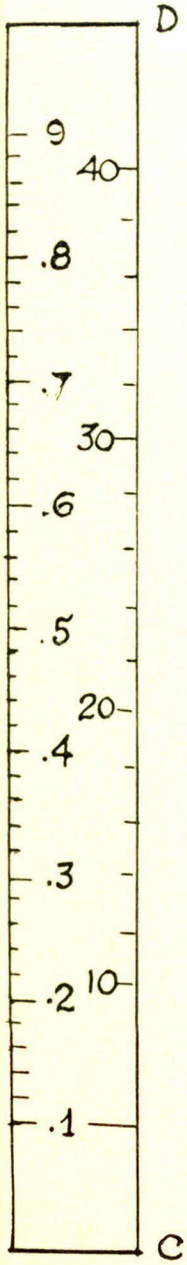
TECHNICAL NOTES

LAKE STATES FOREST EXPERIMENT STATION
U.S. DEPARTMENT OF AGRICULTURE · · · FOREST SERVICE
UNIVERSITY FARM ST. PAUL 1, MINNESOTA

No. 409

The Lake States Cruising Stick[1/]

The Lake States cruising stick has gained considerable popularity as a device for measuring heights of standing trees. It is light, inexpensive, and free from any adjustments. Its chief advantage is that it does not require measuring the horizontal distance from the observer to the tree.



The hypsometer is a wooden stick 12 inches long, 8/10-inch wide, and 2/10-inch thick, with a series of graduations stamped on it. The side AB is graduated into 10 equal parts, and each tenth into 5 small divisions. The side CD is divided into $4\frac{1}{2}$ parts, and each part again into 5 small divisions. The theory of these simple proportions will be better understood from the following instructions.

General. --To estimate total height of a tree or height to any point on the stem, select a position where the entire tree is visible, preferably at a distance equal to the height of the tree. Never stand too close. Hold the stick lightly between the thumb and forefinger and let it hang by its own weight. Move it toward or away from the eye until the line of sight through the lower end of the stick (AC) cuts the base of the tree at the ground line and that through the upper end (BD) cuts the tip of the tree. Without moving the stick, quickly note the point at which the line of sight through .1-graduation on the stick strikes the tree trunk. Measure the height of this point above ground and multiply by 10 to obtain total height. If two men are available, one can slide his finger up and down the stem of the tree and thus help the instrument man to determine the .1-point more carefully.

Tall trees. -- When very tall trees are involved, (a) select some distinct mark on the stem, such as a branch, a stub, discoloration, etc., to "shoot at." Sighting both base and tip of the tree at A and B, respectively, note the point at which the chosen mark cuts the stick. Read this proportion on the scale AB. (b) Next, estimate the height of the mark above ground, as outlined above. Divide the height thus obtained by the proportion determined in step (a) to get the total height of the tree.

If, for example, the height above ground of the stub is estimated to be 48 feet (4.8 x 10) and it was previously found that this distance represents 60 percent of the total height of the tree (0.6 on scale AB), then the total height of tree is 48 / .60 = 80 feet.

1/ This Note supersedes Technical Note No. 69.

Short trees. -- For trees less than 45 feet in height, use the scale CD. Pass one line of sight across the lower end of the stick (AC) to the base of tree, and pass a second line of sight through .1-graduation to the d.b.h. point on the tree (previously marked with chalk), then the point at which the tip of the tr cuts the stick on the CD side will give the height in feet directly.

Another way may also be suggested. Place a chalk mark on the tree trunk 6 fe above the ground. Move away from the tree until the first line of sight can be passed through the lower end of the stick and the base of the tree and the second line of sight through the .1-graduation and the mark made on the trunk. Quickl denote where the tip of the tree cuts on the AB scale. Multiply the graduation on the stick (AB scale) by 60 to determine total height of tree or height to any desired point on the trunk.

Merchantable height. --Merchantable heights up to 6 bolts or 3 standard 16-foot logs can be estimated with the use of the scale CD. Greater merchantable heigh can be determined by the method described under "General."

Using the "6-foot-mark" method described under "Short trees," the following pe centages on the AB scale would indicate the positions of different bolts and logs:

Top of	will come at
1st log, 2nd bolt	29 percent of AB
1½ ", 3rd "	43 " " "
2nd ", 4th "	56 " " "
2½ ", 5th "	70 " " "
3rd ", 6th "	83 " " "
3½ ", 7th "	97 " " "

Measuring diameters. --The cruiser stick can be used also as a Biltmore stick f estimating diameters up to 15 inches. The graduations on the reverse side are:

Diameter (Inches)	Graduations (Inches)	Diameter (Inches)	Graduations (Inches)
1	.98	9	7.72
2	1.92	10	8.45
3	2.84	11	9.17
4	3.71	12	9.86
5	4.57	13	10.54
6	5.39	14	11.21
7	6.19	15	11.86
8	6.96		

To estimate tree diameters, hold the stick horizontally against the trunk 25 inches from the eye. Sight across the left end of the stick and the correspond- ing side of the trunk. Without moving your head, sight across the right side of the tree trunk and read the diameter directly from the stick.

January 1954 S. R. GEVORKIANTZ, Fores